PTO 08-5017

CC = FR
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2663075

HORIZONTAL LADDER SUPPORT DEVICE WHICH COMPENSATES FOR STAIR STEPS

[Dispositif horizontal support d'échelles, compensateur de marches d'escaliers]

Pierre-Gabriel-Serge Testu

UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. MAY 2008
TRANSLATED BY: THE MCELROY TRANSLATION COMPANY

PUBLICATION COUNTRY	(19):	FR
DOCUMENT NUMBER	(11):	2663075
DOCUMENT KIND	(12):	A1
PUBLICATION DATE	(43):	19911213
		Bulletin 91/50
APPLICATION NUMBER	(21):	9007381
APPLICATION DATE	(22):	19901608
INTERNATIONAL CLASSIFICATION[5]	(51):	E 06 C 7/44
PRIORITY NUMBER	(30):	[NONE]
PRIORITY DATE	(30):	[NONE]
PRIORITY COUNTRY	(30):	[NONE]
LIST OF DOCUMENTS MENTIONED IN THE SEARCH REPORT	(56):	Refer to the end of this specification.
REFERENCES TO OTHER RELATED NATIONAL DOCUMENTS	(60):	[NONE]

INVENTOR	(72):	Pierre-Gabriel-Serge Testu
APPLICANT	(71):	Pierre-Gabriel-Serge Testu - France
GRANTEE	(73):	[NONE]

TITLE	(54):	HORIZONTAL LADDER SUPPORT DEVICE WHICH COMPENSATES FOR STAIR STEPS
FOREIGN TITLE	[54A]:	Dispositif horizontal support d'échelles, compensateur de marches d'escaliers

The present invention relates to a horizontal ladder support device which compensates for stairsteps, /1* which can be used by professionals as well as by individuals.

To this day, there are special ladders available with height-adjustable uprights, or scaffoldings which are never perfectly horizontal, or ladder supports in the form of a trough attached on a shoe compensating for the invariable height of a step and positioned in such a way that the end of the trough where an upright of the ladder rests is in an empty [space], [card] great instability proceeds from this.

The device according to the invention makes it possible to remedy this disadvantage. It is composed in effect of a rectangular frame formed by four metallic structural bars, three of which all contain a structural bar with a smaller cross section and slide in one another, making it possible to increase the surface area of the frame. The platform thus formed rests on four bearing points, two on the fixed part. two on the mobile part by the intermediary of two legs with rectangular cross section which widen towards the base by a single surface. The height of each leg can be adjusted by a quick locking system entailing a roller with an eccentric shaft, contained in a T-shaped support that fits in the end of each sliding structural bar. Each quick locking system is provided with a safety system consisting of a connecting rod mounted on the lever of the quick locking system, the threaded end of the connecting rod running outside of the support through a hole is maintained in the desired position by a tightening nut. The thrust surface of the locking system has the same inclination as the inclined surface of the leg and fits perfectly, prohibiting any sliding of one over the other. In its spread out position, the platform provided on its upper surface with a rigid and firmly connected metallic lattice has a length which is slightly smaller than the width of three steps between 25 and 28 cm. It compensates for the height of two standard steps, between 13.5 and 18 cm. It enables one to put a ladder or step plate there. By loosening two lateral tightening nuts and the quick locking systems, one releases the sliding structural bars and the legs which can then rest on a lower step. A second metallic lattice sliding in two slideways connected

* [Numbers in right margin indicate pagination of the original text.]

with the fixed frame increases the surface area of the platform by resting on the sliding structural bars, so that its is possible to put a ladder with a wide base there. The platform can be positioned in one direction or the other [with respect] to that of the steps. In one direction, one of the two supports provided with its leg is seated in the reduced section of the longest longitudinal structural bar, [and] the platform rests on the lower surface of the parallel structural bar. In order to move the platform away from the carrier step, there is 1) a structural bar contained in the longest transverse structural bar of the /2
fixed frame, 2) by a structural bar sliding in a connectable structural bar which fits by one of its ends in the place left by the leg support which was moved and by the other end which fits in a sleeve formed by the extension of the structural bar constituting the body of the leg support which remained in place. Each of the sliding structural bars can be locked in a chosen position by a tightening bolt. The platform thus spread out can be reversed by fitting the supports and their legs at the end of the transverse sliding structural bars. The leg support with sleeve is replaced by a joining elbow. The platform thus spread out compensates for the same step height and width as in its initial position. The three structural bars sliding in the fixed frame, which are provided with supports and their legs being independent from one another, makes it possible to install the platform in a spiral stairway. The fixed frame has a level on each of two sides making it possible to maintain the horizontality during the adjustment maneuver. According to another form of execution of the leg supports, the legs with rectangular cross section are replaced by threaded cylindrical rods maintained in a threaded hole situated at the center of a metallic block contained in the structural bar constituting the leg support. Each quick locking system is replaced by a mechanism consisting of a thick washer whose diameter is greater than the width of the support and which is screwed through its threaded hole onto the threaded cylindrical rod until being tightened on the upper surface of the support, thus locking the cylindrical rod. At the upper end of the cylindrical rod, a handle enables one to screw or unscrew this rod. Attached at the lower end of the threaded rod is a foot

holder provided with a foot made of slip resistant material. At the end of each spread out sliding structural bar, a ring made of slip resistant material fits.

The appended drawings illustrate the invention.

Figure 1 represents the fixed frame.

Figure 2 represents the mobile frame.

Figure 3 represents the left leg support.

Figure 4 represents the connectable structural bar and its sliding structural bar.

Figure 5 represents a leg with a rectangular profile.

Figure 6 represents a quick locking system of actual size.

Figure 7 represents the cylindrical legs and their support.

Figure 8 represents a cylindrical leg and support of actual size in cross section. /3

Figure 9 represents the platform spread out, with the right leg support fit in the reduced section of the longest structural bar.

Figure 10 represents the platform spread out, with the leg supports fit in the sliding lateral structural bars.

Figure 11 represents the joining elbow.

Figure 12 represents (for the abstract) the platform spread out longitudinally.

Figure 13 represents the circular cup and the cylindrical piece of the quick locking system of actual size in cross section.

In reference to these drawings, according to Figure 1, the device has a fixed frame formed by two longitudinal structural bars (2) and (3) with rectangular cross section and two transverse structural bars (4) and (5) of lesser length with the same cross section. The cross section of structural bar (4) is visible, longitudinal bar being attached on the interior side of structural bar (4). On the upper surface of the four

structural bars (2) (3) (4) (5) rigid metallic lattice (6) is attached on each edge of the upper surfaces of structural bars (2) and (3), slideway (7) is attached on metallic lattice (6). Under each corner formed by structural bars (2) (3) (4) (5), foot (8) made of slip resistant material is attached. On the exterior side of structural bars (2) (3) and (4), hole (9) is made, which serves as a guide and stop for the rod of tightening bolt (10). Inside of structural bar (4), structural bar (11) of the same length slides. Exterior section (12) of structural bar (3) is reduced in order to have the same surface area as that of the sliding structural bars, over a length equal to the width of the structural bar. On the side of reduced section (12), [there is] hole (13) for the passage of the rod of tightening bolt (14). On the exterior side of structural bar (3) [there is a] level (15). On the exterior side of the ends of structural bars (2) (3) and (4), notch (16) is made for the passage of a tightening bolt rod.

According to Figure 2, the mobile part of the platform is formed by two structural bars (17) which slide in structural bars (2) and (3). On their exterior side, [there is] threaded hole (18) for receiving the threaded rod of tightening bolt (10) that locks the sliding structural bars in a chosen position in the fixed structural bars. On the exterior side of the ends of sliding structural bars (17) and (11), [there is] hole (20) for the passage of the rods of tightening bolts (21). On the upper surface of structural bars (17), a series of holes (22) is made. The mobile part also has metallic lattice (23) which slides in slideways (7) and rests on structural bars (17) by its exterior end provided with crosspiece (24) with a square cross section. The interior side of the crosspiece is open in order to receive the exterior end of sliding /4 lattice (23). Under the lower surface of crosspiece (24), two stop pins (25) are screwed, which by their threaded rod (26) lock lattice (23) in crosspiece (24). Stop pins (25) are set in holes (22). Leg supports (27) and (28) are made up of short structural bar (29) of which one of the sections is attached perpendicularly on the side of structural bar portion (30) with a larger cross section. Each support (27) and (28) can fit in structural bars (11) and (17) as well as in reduced section (12) of structural bar (3) by

means of their structural bar (29) with a smaller cross section. On the exterior side (31) of structural bars (28) and (29), threaded hole (32) receives the rod of tightening bolt (21). Each structural bar (30) contains quick locking system (34). On the upper and lower surface of each structural bar (30), rectangular and superposed hole (35) is made, where leg (36) travels vertically running between the jaws of quick locking system (34).

According to Figure 3, the extension of the surfaces of structural bar (30) of support (27) forms sleeve (37) in which, according to Figure 4, end (38) of structural bar (40) which can be connected to sliding structural bar (17) is fit as a replacement for leg support (28). On the exterior side of structural bar (40), hole (41) for the passage of the threaded rod of tightening bolt (42) which is screwed in threaded hole (43), arranged on the exterior side of structural bar (44) which slides inside. Attached on the interior side of structural bar (40) is sleeve (45) in the form of a structural bar with a smaller rectangular cross section than the cross section of structural bar (17) and which fits in this structural bar. Each of structural bars (44) and (11), at the end of its exterior side, has hole (46) for the passage of a threaded rod of tightening bolt (21) making it possible to lock leg supports (27) and (28) which can fit in their cross section. At the end of spread out sliding structural bars (44) and (11), ring (47) made of slip resistant material fits.

According to Figure (5), legs (36) with a total height of 64 cm are in the form of rectangular structural bars whose cross section widens towards the base by inclined surface (48) which at the base makes an acute angle between 1 and 3 degrees. They make it possible to compensate for steps whose height ranges from 13.5 to 18 cm. Fit on the lower section of each leg (36) is foot (49) made of slip resistant material. On the upper section of leg (36) is protective cover (50) made of plastic material is fit. /5

According to Figure 6, each quick locking system (34) with eccentric shaft (51) consists of pieces manufactured out of molded light alloy. It has guide plate (52) perforated on each side with four holes

(53) for the passage of securing bolt rods (54). At the center of its exterior surface, hole (55) for the passage of eccentric shaft (51) [is made]. One end of guide plate (52) functions as fixed jaw (56). On guide plate (52), mobile frame (57) slides. At its center, rectangular recess (58) for housing of shim (59). One of the ends of mobile frame (57) functions as mobile jaw (60) whose thrust surface is inclined, forming an acute angle at its base with the same number of degrees as that formed by inclined surface (48) of the legs. On mobile frame (57), pivoting around eccentric shaft (51) – see Figure (13) in cross section – is ring (61) machined on one of its two lateral surfaces with circular cup (62) whose diameter is slightly larger than the radius of ring (61). At the bottom and at the center of cup (62), [there is] a hole for the passage of eccentric shaft (51). Cup (62) receives cylindrical piece (63) provided with rim (64) of greater diameter than the body. The lower part of rim (64) has swelling (65) which is seated in recess (66) placed on the upper edge of cup (62) and makes it possible to connect ring (61) and cylindrical piece (63) in the circular movement. Cylindrical piece (63) at its center has hexagonal recess (67) where the head of eccentric shaft (51) is housed, a shaft whose rod is threaded on the end part of its length. On the exterior periphery of the body of cylindrical piece (63), groove (68) where the thinned end of lever (69) is housed, that is screwed in the body of ring (61) preventing untimely exit of cylindrical piece (63) from its cup (62). Still according to Figure (6), each quick locking system (34) has a safety device consisting of connecting rod (70) whose foot perforated in its center with circular hole (71) and provided with bearing (72) pivots around shaft (73) maintained by two concave cheeks of collar (74) mounted on the base of lever (69) for maneuvering of quick locking system (34). The width of bearing (72) is greater than the thickness of the foot of connecting rod (70). Shaft (73) threaded on its end part receives nut (76). Connecting rod (70) threaded over half of its length goes into hole (77) machined in the lower surface of structural bar (30) of leg support (28) and receives tightening nut (78) outside of it. Nut (39) moving in slideway (75) machined on the external surface of guide plate (52) (a lip on each side of the /6

hole) (55) is screwed at the end of threaded eccentric shaft (51).

In the form of execution according to Figure (7), each of leg supports (79) is formed by structural bar (80) with a rectangular cross section enabling it to fit in the four sliding structural bars (11), (17), (44), as far as projections (81) made on its upper and lower surface arranged midway in its length. On the exterior side of the nesting part of structural bar (80), threaded hole (82) for receiving tightening nut (21) according to Figure (8) at the center of the upper and lower surface of the exterior part of structural bar (80), hole (83) for the passage of cylindrical leg (84). Inside of the exterior part of structural bar (80), metallic block (85) held in place by projection and curving of the metal is machined at its center with threaded hole (86) where cylindrical leg (84) threaded with the same pitch moves, leg whose height is 64 cm and which is provided at its lower end with foot holder (87) provided with foot (88) made of slip resistant material. On the upper part of leg (84), thick washer (89) whose hole is threaded is screwed as far as the upper surface of support (9), locking leg (84) by this maneuver. Handle (91) passing through hole (92) made at the upper end of leg (84) makes it easy to screw or unscrew this leg, thus adjusting foot holder (87) and its foot (88) to the desired height.

According to Figure (9), right support (28) provided with its leg (36) has been seated in reduced section (12) of longest longitudinal structural bar (3). Left support (27) with sleeve receives connectable structural bar (40). Lateral sliding structural bars (11) and (17), spread out by their end part provided with their ring made of slip resistant material (47), [and] the bearing part of the platform has been moved away from the first upper step.

According to Figure (10), the two supports (27) and (28) and their leg (36) have been seated at the ends of lateral sliding structural bars (11) and (17). Left support (27) is replaced by joining elbow (93). The bearing part of the platform is reversed and rests on the first upper step.

According to Figure 11, joining elbow (93) is formed by structural bar (94) whose cross section can receive end (38) of connectable structural bar (40), and by structural bar (95) attached at a right angle on the side of structural bar (94), its cross section allowing it to fit in longitudinal sliding structural bar (17). Attached under the lower surface of structural bar (94) is foot (96) made of slip resistant material.

Claims /7

1. A ladder support device which compensates for stair steps, formed by an extensible rectangular platform resting on four bearing points, two of which are height adjustable, characterized by the fact that is has fixed frame (1) covered with rigid metallic lattice (6) and with mobile metallic lattice (23), which rests on one of its ends on two structural bars (17) which slide inside of longitudinal structural bars (2) and (3) of frame (1). The platform rests on two feet made of slip resistant material attached under one end of frame (1) and [rests] by the other end on two feet made of slip resistant material attached under two legs (36) and (84) each maintained at the chosen height by a locking system.

2. A device according to Claim (1), characterized by the fact that the two legs (36) have a rectangular profile, each maintained at the chosen height by quick locking system (34) with eccentric shaft contained in support (27 – 28) fit in sliding structural bar (17).

3. A device according to Claim (1), characterized by the fact that the two legs (84) are cylindrical, threaded, each maintained and traveling in metallic block (85) contained in support (79), the leg being locked at the chosen height by circular piece (89) screwed on the upper part of leg (84) as far as support (79).

4. A device according to Claim (1), characterized by the fact that each of longitudinal structural bars (2) and (3) and transverse structural bar (4) of frame (1), on its exterior surface, has hole (9) serving as guide and stop for tightening bolts (14) of sliding structural bars (17) and (4).

5. A device according to Claim (1), characterized by the fact that two slideways (7) attached on frame (1) serve as a guide for mobile lattice (23).

6. A device according to Claim (1), characterized by the fact that the platform can be spread out laterally by sliding structural bar (11) and by another sliding structural bar (44) contained in structural bar (40) which can be connected by one of its ends to leg support (27), and by the other end, by sleeve (45) fit in right sliding structural bar (17).

7. A device according to Claim (1), characterized by the fact that each leg (36) is a structural bar whose rectangular cross section widens by a single inclined surface (48) which at its base makes an acute angle between 1 and 3 degrees, /8

8. A device according to Claim (1), characterized by the fact that the thrust surface of mobile jaws (60) of quick locking systems (34) are [sic] inclined and at their base make an acute angle between 1 and 3 degrees.

9. A device according to Claim (2), characterized by the fact that cylindrical piece (63) contained in cup (62) of eccentric ring (61) of quick locking systems (34) has, on the circumference of the body, groove (68) where the thinned end of maneuvering lever (69) is housed.

10. A device according to Claim (2), characterized by the fact that each locking system (34) has a safety mechanism consisting of connecting rod (70) whose head travels around shaft (73) maintained by the cheeks of collar (74) mounted on lever (69). The threaded foot of connecting rod (70) running outside of structural bar (30) through hole (77) is maintained in this position by tightening nut (78).

11. A device according to Claim (3), characterized by the fact that cylindrical leg (84), at its upper end, has hole (92) where handle (91) is housed, and at its other end, has foot holder (87) and its foot (88).

12. A device according to Claim (6), characterized by the fact that the platform spread out laterally can be reversed, the supports are seated at the ends of the lateral sliding structural bars, [and] left support (27) is replaced by joining elbow (93).

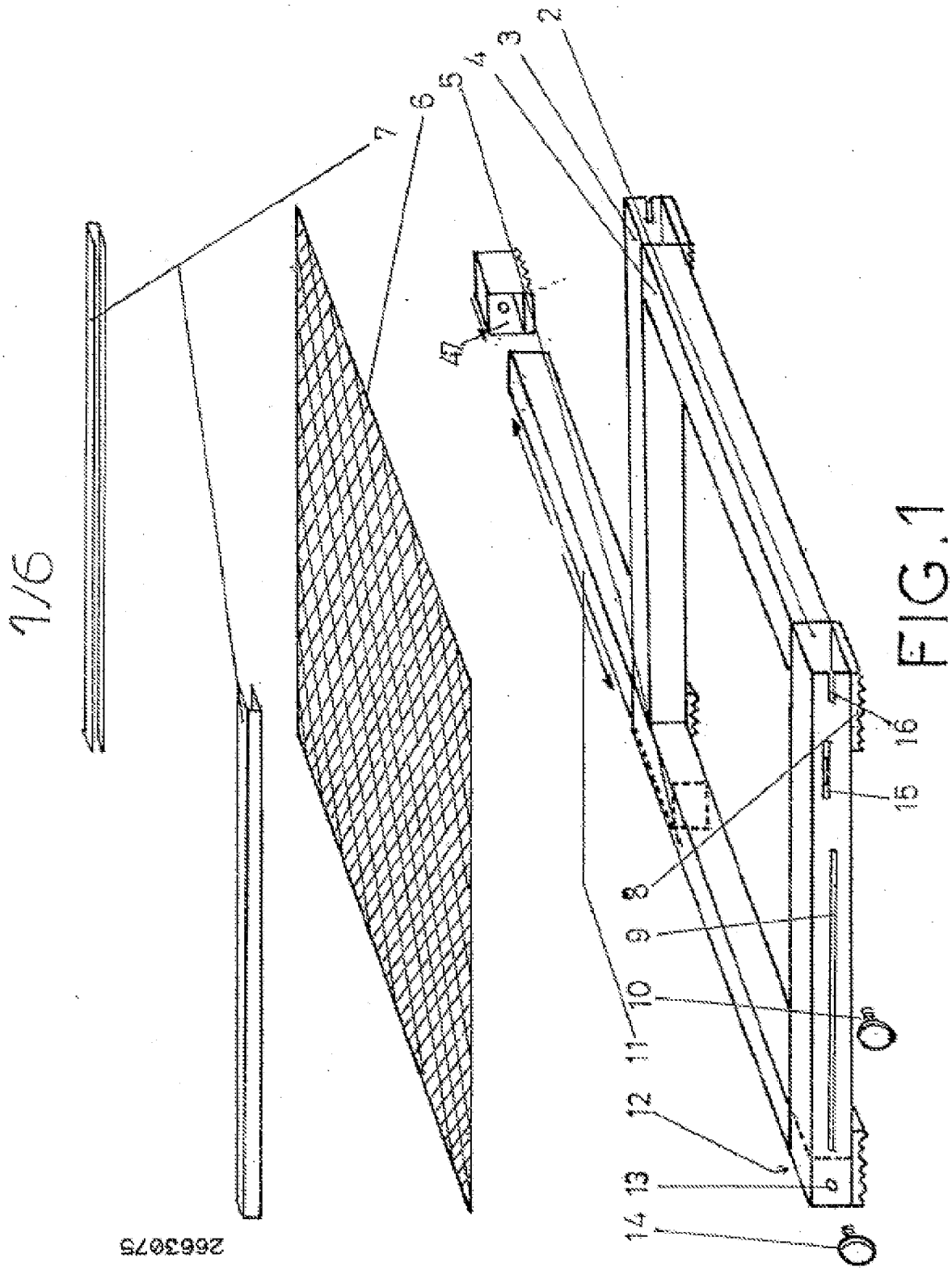

FIG.1

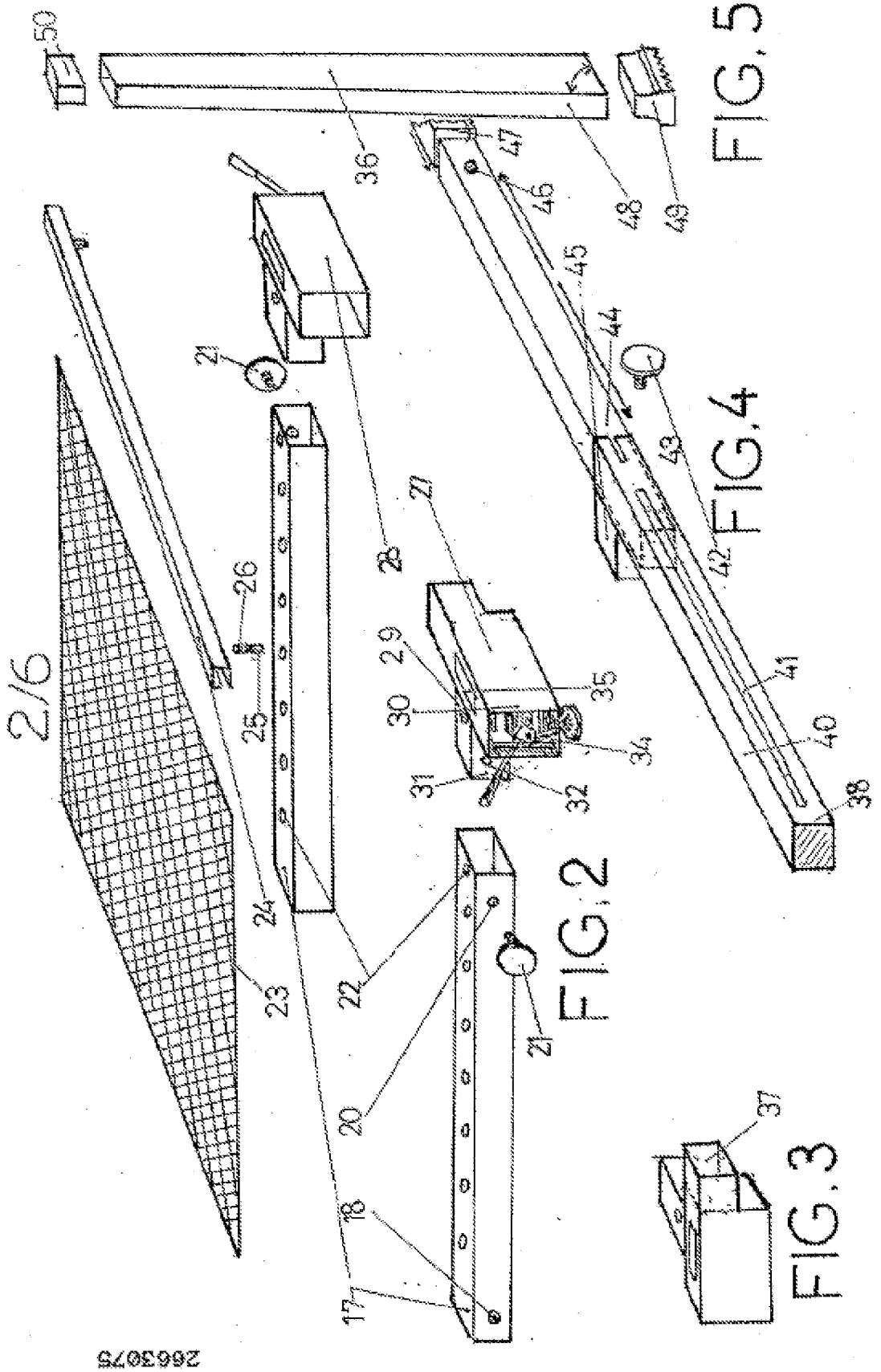
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FIG. 2
FIG. 3
FIG. 4
FIG. 5

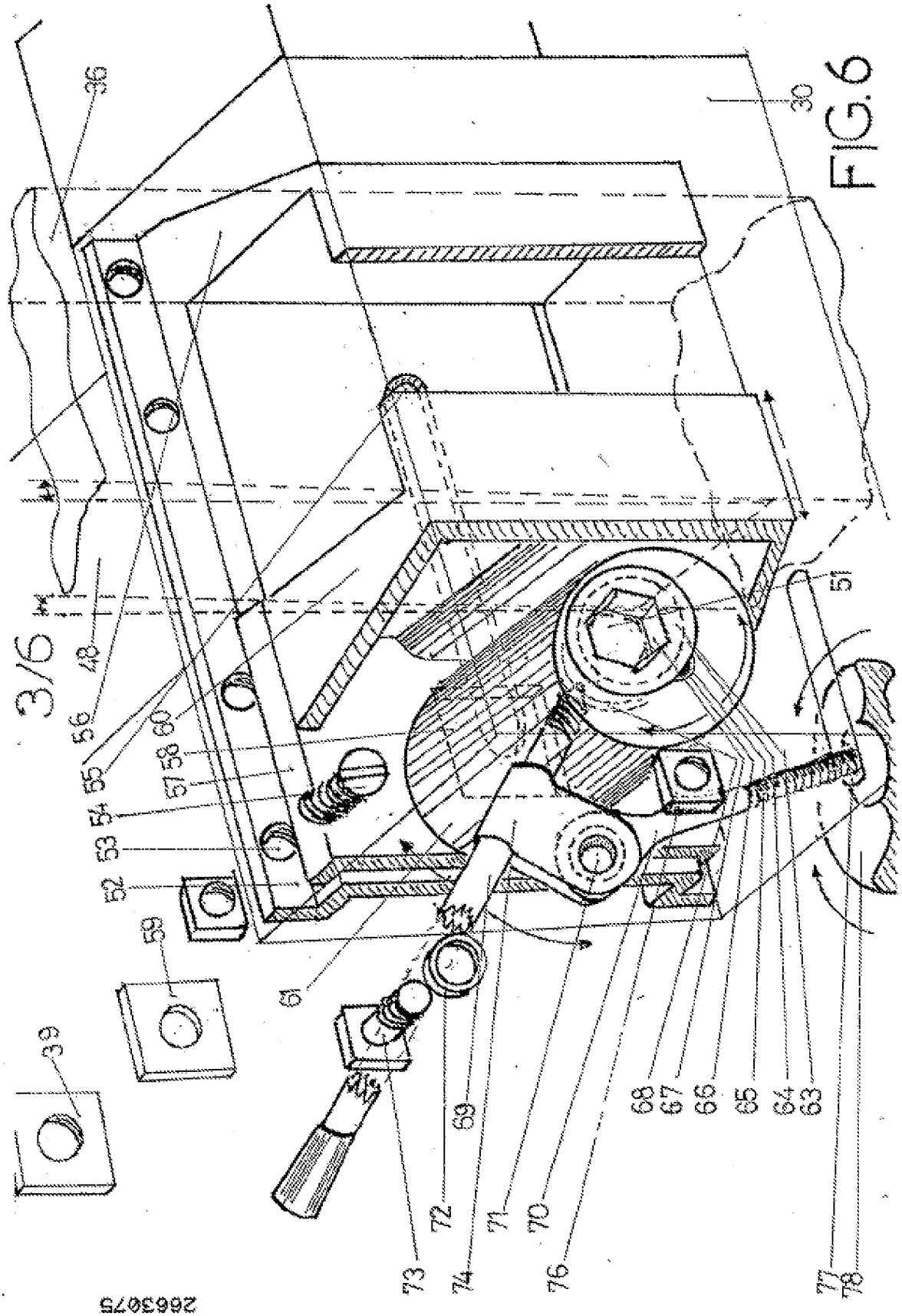
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FIG.6
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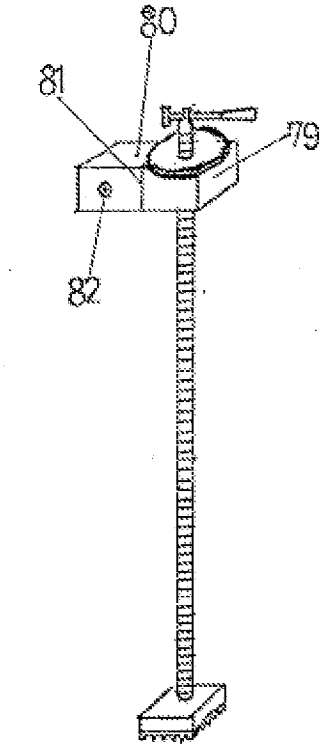

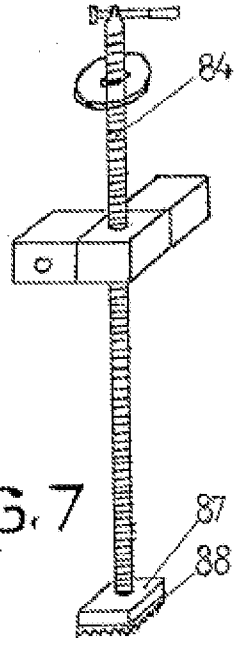

FIG. 7

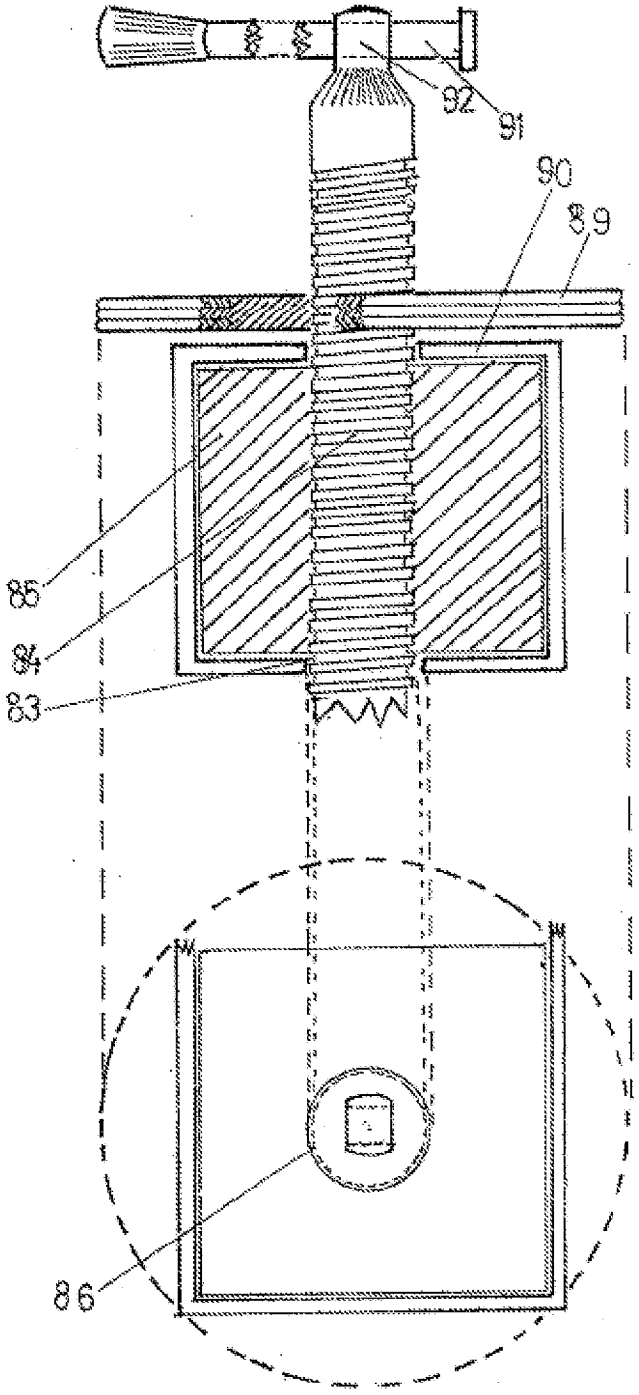

FIG.8

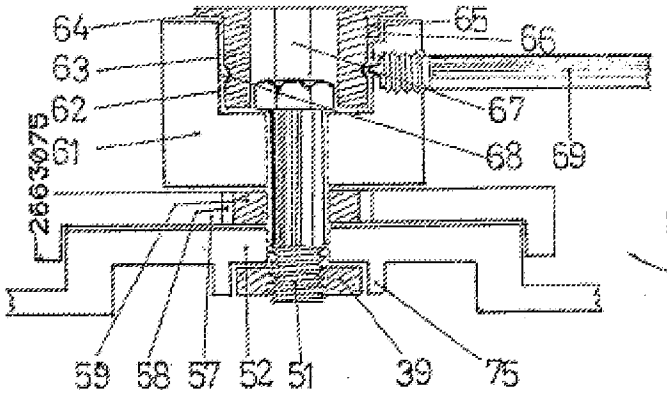

FIG.13

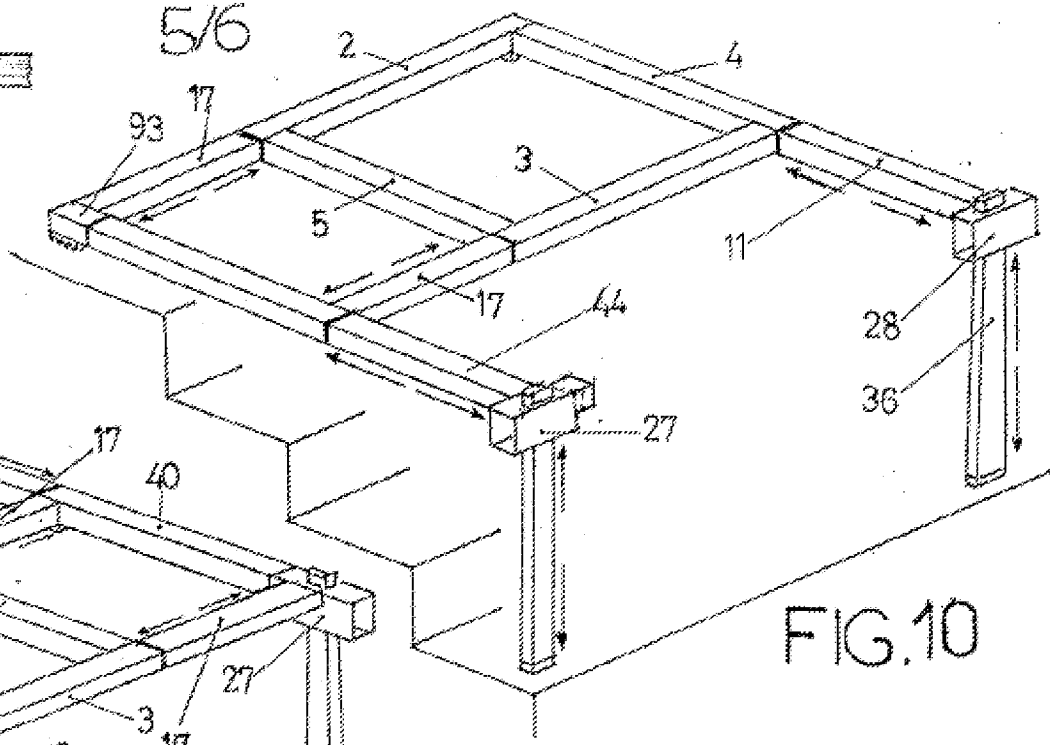

FIG.10

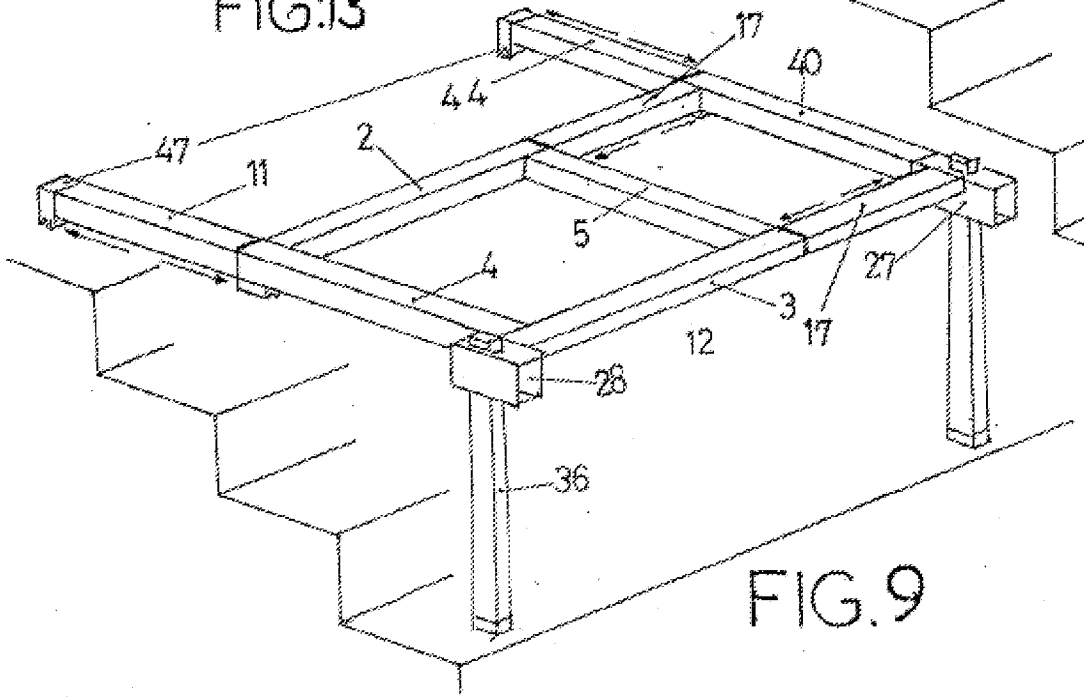

FIG.9

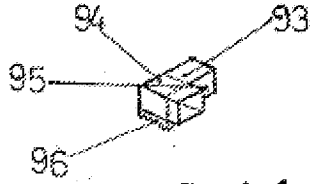

FIG.11

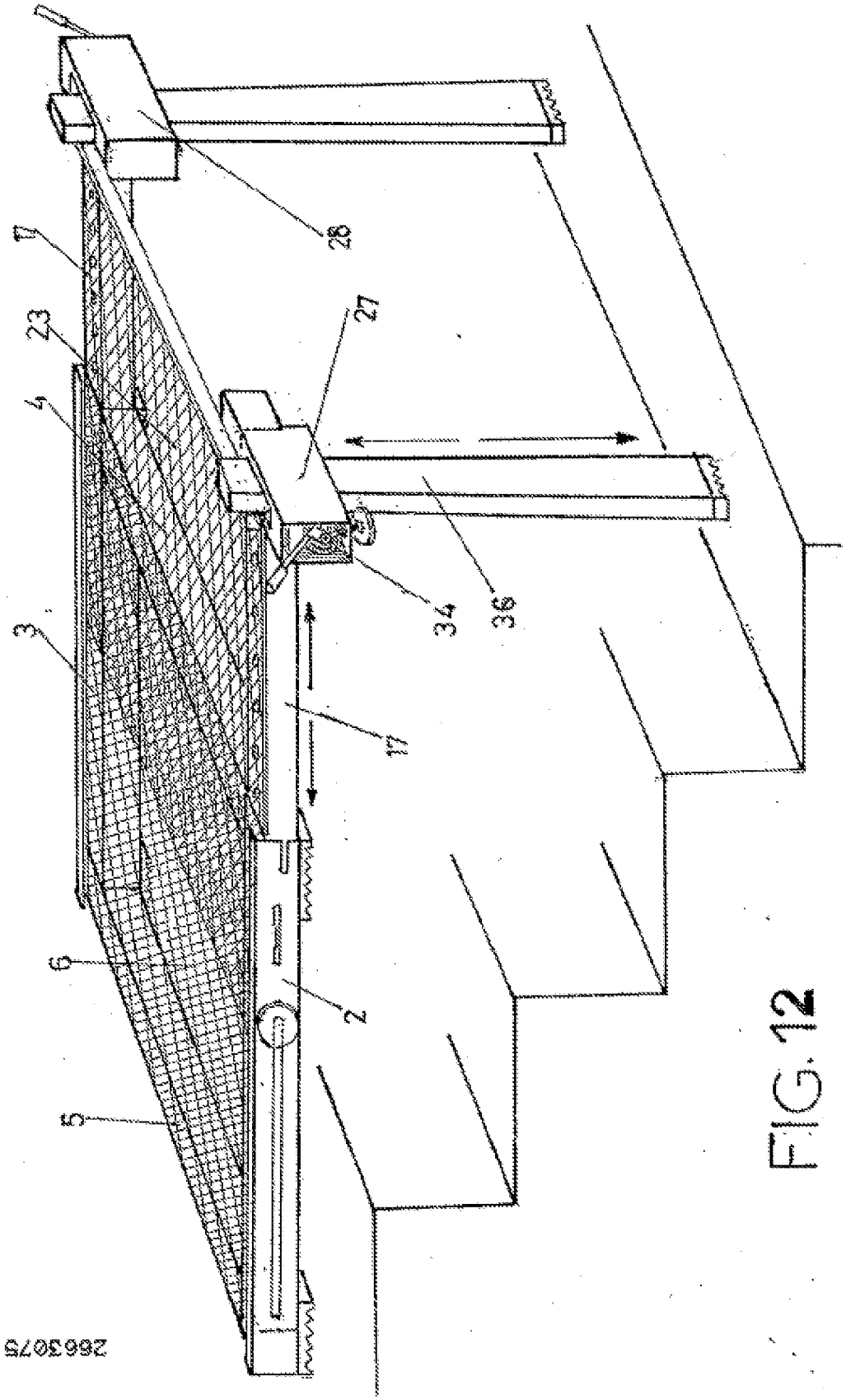

FIG. 12

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FRENCH REPUBLIC National Institute of Industrial Property	SEARCH REPORT established on the basis of the most recent claims filed before the start of the search	Application Number FR 9007381 FR 446432

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication where appropriate, of relevant passages	Claims concerned in the examined document	
Y	FR-A-2 471 467 (O. FETT) * Page 2, line 33 – page 4, line 12; figures 1, 2 *	1	
A		2	

Y	WO-A-8 502 650 (CLARKE) * Page 5, line 18 – page 6, line 7; figures 1-3 *	1	

A	DE-A-3 605 790 (S. ERNST) * Claims 1-4; figures 1-5 *	1,2,4	

A	US-A-4 371 057 (D. BLIER) * Column 2, line 31 – column 3, line 13; figure 1, 3, 4 *	1,3,6	

A	GB-A-736 400 (T.H.N. AYSCOUGH) * Page 2, line 26-35; figures 3, 4, 6 *	2	TECHNICAL FIELDS SEARCHED (Int. Cl.[5])

A	DE-U-8 604 505 (HÜNNEBECK GmbH) * Page 8, lines 12-31; figures 7-9 *	3,11	E 06 C E 04 G

A	US-A-4 457 397 (SCALA) * Abstract; figures 1, 3, 5, 6 *	1,3	

A	GB-A-2 208 172 (R.L. BATTISTE) * Claims 1-3; figures 2, 3 *	1	

Date of completion of the search	Examiner
January 14, 1991	RIGHETTI R.

CATEGORY OF CITED DOCUMENTS

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